IN THE SPECIFICATION

Please amend the paragraphs of the specification as follows:

Please replace the paragraph starting on page 1, line 6, to read as follows:

This application is a continuation application of ~~co-pending~~ Application Serial No. 09/479,735, filed January 7, 2000, now U.S. Patent No. 6,393,012, issued May 21, 2002, entitled "SYSTEM FOR ALLOCATING RESOURCES IN A COMMUNICATION SYSTEM," ~~now allowed and~~ currently assigned to the assignee of the present application, and which is a continuation-in-part of U.S. Patent No. 6,229,795, entitled "SYSTEM FOR ALLOCATING RESOURCES IN A COMMUNICATION SYSTEM," issued May 8, 2001, also assigned to the assignee of the present application and which is expressly incorporated by reference herein.

Please replace the paragraph starting on page 4, line 33, to read as follows:

In ~~anther~~ another aspect of the invention, a wireless transmitter apparatus is provided, comprising: at least one antenna for receiving requested data rate signals from each of a plurality of customer nodes and for directing information signals to said plurality of customer nodes; a channel element for modulating a data signal for transmission through said at least one antenna to each of said plurality of customer nodes; and a channel scheduler for maintaining a set of weights corresponding to each of the customer nodes, identifying a minimum weight M from said set of weights, identifying a subset of said customer nodes having weights less than or equal to the sum of M and an offset K, determining a desirability metric value for each customer node in the subset, selecting from the subset a most desired customer node having the greatest desirability metric value, providing information corresponding to the most desired customer node to said channel element, and updating the set of weights.

Please replace the paragraph on page 5, line 22, to read as follows:

~~Figure~~ FIG. 1 shows a communication network according to an embodiment of the present invention.

Please replace the paragraph on page 5, line 24, to read as follows:

~~Figure~~ FIG. 2a shows a block diagram of a base station controller and base station apparatus configured in accordance with an embodiment of the present invention.

Please replace the paragraph on page 5, line 27, to read as follows:

~~Figure~~ FIG. 2b shows a block diagram of a remote station apparatus configured in accordance with an embodiment of the present invention.

Please replace the paragraph on page 5, line 29, to read as follows:

~~Figure~~ FIG. 3 shows a flow diagram illustrating the execution of a scheduling algorithm in an embodiment of the channel scheduler shown in ~~Figure~~ FIG. 2.

Please replace the paragraph on page 5, line 31, to read as follows:

~~Figure~~ FIG. 4 shows a diagram illustrating the timing of the execution of an embodiment of the scheduling algorithm shown in ~~Figure~~ FIG. 3.

Please replace the paragraph on page 6, line 1, to read as follows:

~~Figure~~ FIG. 5 shows a flow diagram illustrating an embodiment of the process for updating the weights for a selected queue in the embodiment identified in ~~Figure~~ FIG. 3.

Please replace the paragraph on page 6, line 4, to read as follows:

~~Figures~~ FIGs. 6a through 6c show a flow diagram illustrating a first embodiment of the process for selecting a queue to receive data transmission in a service interval identified in ~~Figure~~ FIG. 3.

Please replace the paragraph on page 6, line 7, to read as follows:

~~Figures~~ FIGs. 7a through 7d show a flow diagram illustrating a second embodiment of the process for selecting a queue to receive data transmission in a service interval identified in ~~Figure~~ FIG. 3.

Please replace the paragraph on page 6, line 10, to read as follows:

~~Figures~~ FIGs. 8a and 8b show a flow diagram illustrating a third embodiment of the process for selecting a queue to receive data transmission in a service interval identified in ~~Figure~~ FIG. 3.

Please replace the paragraph on page 6, line 13, to read as follows:

~~Figure~~ FIG. 9 shows a high level flow diagram illustrating an alternate process for updating the weights for a selected queue in the embodiment identified in ~~Figure~~ FIG. 3.

Please replace the paragraph on page 6, line 16, to read as follows:

~~Figure~~ FIG. 10 shows a detailed flow diagram of an embodiment of the process shown in ~~Figure~~ FIG. 9.

Please replace the paragraph starting on page 6, line 32, to read as follows:

Referring to the figures, ~~Figure~~ FIG. 1 represents an exemplary variable rate communication system. One such system is described in the U.S. Patent Application Serial No. 08/963,386, now U.S. Patent No. 6,574,211, issued June 3, 2003, entitled "METHOD AND APPARATUS FOR HIGH RATE PACKET DATA TRANSMISSION," ~~filed on November 3, 1997,~~ assigned to Qualcomm, Inc. and incorporated herein by reference. The variable rate communication system comprises multiple cells 2a-2g. Each cell 2 is serviced by a corresponding base station 4. Various remote stations 6 are dispersed throughout the communication system. In the exemplary embodiment, each of remote stations 6 communicates with at most one base station 4 on a forward link at any data transmission interval. For example, base station 4a transmits data exclusively to remote station 6a, base station 4b transmits data exclusively to remote station 6b, and base station 4c transmits data exclusively to remote station 6c on the forward link at time slot n. As shown by ~~Figure~~ FIG. 1, each base station 4 preferably transmits data to one remote station 6 at any given moment. In other embodiments, the base station 4 may communicate with more than one remote station 6 at a particular data transmission interval to the exclusion of all other remote stations 6 associated with the base station 4. In addition, the data rate is variable and is dependent on the carrier-to-interference ratio (C/I) as

measured by the receiving remote station 6 and the required energy-per-bit-to-noise ratio (Eb/N0). The reverse link from remote stations 6 to base stations 4 is not shown in ~~Figure~~ FIG. 1 for simplicity. According to an embodiment, the remote stations 6 are mobile units with wireless transceivers operated by wireless data service subscribers.

Please replace the paragraph starting on page 7, line 21, to read as follows:

A block diagram illustrating the basic subsystems of an exemplary variable rate communication system is shown in ~~Figures~~ FIGs. 2a-2b. Base station controller 10 interfaces with packet network interface 24, public switched telephone network (PSTN) 30, and all base stations 4 in the communication system (only one base station 4 is shown in ~~Figure~~ FIG. 2 for simplicity). Base station controller 10 coordinates the communication between remote stations 6 in the communication system and other users connected to packet network interface 24 and PSTN 30. PSTN 30 interfaces with users through a standard telephone network (not shown in ~~Figure~~ FIG. 2).

Please replace the paragraph starting on page 7, line 30, to read as follows:

Base station controller 10 contains many selector elements 14, although only one is shown in ~~Figure~~ FIG. 2a for simplicity. Each selector element 14 is assigned to control communication between one or more base stations 4 and one remote station 6. If selector element 14 has not been assigned to remote station 6, call control processor 16 is informed of the need to page remote station 6. Call control processor 16 then directs base station 4 to page remote station 6.

Please replace the paragraph starting on page 8, line 25, to read as follows:

In FIG. 2b, at [[At]] remote station 6, the forward link signal is received by antenna 60 and routed to a receiver within front end 62. The receiver filters, amplifies, quadrature demodulates, and quantizes the signal. The digitized signal is provided to demodulator (DEMOD) 64 where it is despread with the short PNI and PNQ codes and decovered with the Walsh cover. The demodulated data is provided to decoder 66 which performs the inverse of the

signal processing functions done at base station 4, specifically the de-interleaving, decoding, and CRC check functions. The decoded data is provided to data sink 68.

Please replace the paragraph starting on page 10, line 20, to read as follows:

As shown in ~~Figure~~ FIG. 1, remote stations 6 are dispersed throughout the communication system and can be in communication with zero or one base station 4 on the forward link. In the exemplary embodiment, channel scheduler 12 coordinates the forward link data transmissions over the entire communication system. A scheduling method and apparatus for high speed data transmission are described in detail in U.S. Patent Application Serial No. 08/798,951, now U.S. Patent No. 6,335,922, issued on January 1, 2002, entitled "METHOD AND APPARATUS FOR FORWARD LINK RATE SCHEDULING," ~~filed February 11, 1997,~~ assigned to the assignee of the present invention and incorporated by reference herein.

Please replace the paragraph starting on page 11, line 1, to read as follows:

~~Figure~~ FIG. 3 shows an embodiment of a scheduling algorithm which controls the channel scheduler 12 to schedule transmissions from the base station 4 to the remote stations 6. As discussed above, a data queue 40 is associated with each remote station 6. The channel scheduler 12 associates each of the data queues 40 with a "weight" which is evaluated at a step 110 for selecting the particular remote station 6 associated with the base station 4 to receive data in a subsequent service interval. The channel scheduler 12 selects individual remote stations 6 to receive a data transmission in discrete service intervals. At step 102, the channel scheduler initializes the weight for each queue associated with the base station 4.

Please replace the paragraph starting on page 11, line 1, to read as follows:

~~Figure~~ FIG. 4 shows a diagram illustrating the timing of the channel scheduler 12 and data transmission in service intervals. ~~Figure~~ FIG. 4 shows three discrete service intervals during transmission at time intervals S-1, S0 and S1. As steps 104 through 112 of the scheduling algorithm of ~~Figure~~ FIG. 4 are executed during service intervals 202, the scheduling algorithm executing during the interval S0 preferably determines which queue is to be transmitted at the interval S1. Also, as discussed below, the execution of steps 104 through 112 relies on

information in the DRC signals received from the remote stations 6. This information is preferably extracted from the most recently received DRC signals. Accordingly, the steps 104 through 110 are preferably executed and completed during the last time slot of the service intervals. This ensures that the decisions for allocating the subsequent service interval are based upon the most recent DRC signals (i.e., those DRC signals which are in the time slot immediately preceding the execution of the steps 104 through 110).

Please replace the paragraph starting on page 13, line 17, to read as follows:

Steps 104 and 110 are preferably completed within a time slot while providing sufficient time for the channel scheduler 12 to schedule the transmissions for the subsequent service interval. Thus the processor and RAM employed in the channel scheduler 12 are preferably capable of performing the steps 104 through 112 within the time constraints illustrated in ~~Figure~~ FIG. 4. That is, the processor and RAM are preferably sufficient to execute steps 104 through 110, starting at the beginning of a time slot and completing steps 104 through 110, within sufficient time before the end of the time slot for the channel scheduler 12 to schedule transmissions in a subsequent service interval.

Please replace the paragraph starting on page 14, line 5, to read as follows:

~~Figure~~ FIG. 5 shows an embodiment of the process for updating the weights at step 112 (~~Figure~~ FIG. 3). Step 302 computes a rate threshold "C" which is an average of all of the instantaneous rates associated with queues having data. The instantaneous rates associated with queues which do not include data are preferably eliminated for this calculation. Step 304 compares the instantaneous rate associated with the Selected_Queue selected at step 110. If an instantaneous rate associated with a Selected_Queue exceeds the threshold C, step 306 increments the weight associated with this Selected_Queue by a lower value which is preferably a number representing the quantity of data to be transmitted during the subsequent service interval from the Selected_Queue in units such as bits, bytes or megabytes. If the instantaneous rate associated with the Selected_Queue does not exceed the threshold calculated at step 302, step 308 increments the weight of the Selected_Queue by a higher value which is preferably a

multiple "G" of the quantity of data which is to be transmitted during the subsequent service interval from the Selected_Queue such as bits, bytes or megabyte quantities.

Please replace the paragraph starting on page 14, line 33, to read as follows:

Steps 304, 306 and 308 illustrate that selected queues having a faster associated instantaneous data rate (i.e., exceeding the threshold C) will tend to have the associated weight incremented by only a small amount, while selected queues having a lower data rate (i.e., not exceeding the threshold C) will have its associated weight incremented by a significantly greater amount. As discussed below in connection with the algorithm performed at step 110 of ~~Figure~~ FIG. 3, this implementation tends to favor servicing remote stations which receive data at relatively faster rates over those remote stations receiving data at lower data rates.

Please replace the paragraph starting on page 15, line 21, to read as follows:

It is an objective of the present embodiment to ensure that queues having no data to transmit are not given an unfair preference for transmission over those queues having data. At steps 102 and 104, all new queues are initialized with a weight of zero. Without being selected, such queues will continue to maintain the weight of zero provided that the queue is not selected. Therefore, step 310 in ~~Figure~~ FIG. 5 decrements the weight of all queues, to a value no less than zero, by the minimum weight of any queue with data (determined at step 309). This is illustrated in detail below in an example shown in Table 2.

Please replace the paragraph starting on page 17, line 13, to read as follows:

At the beginning of service interval 3, remote station 3 has the lowest weight. The channel scheduler 12 selects remote station 3 to receive data at the service interval 4. The state at the end of interval 3 reflects that weight of the remote station 3 was incremented from zero to eight to reflect the selection of the remote station 3. The weights at the remote stations 1, 2 and 3 are then decremented by one which is consistent with step 310 (~~Figure~~ FIG. 5) as indicated in Table 2. At service interval 4, the channel scheduler 12 selects remote station 1 to receive data in service interval 4 since the queue associated with remote station 1 has the lowest weight and the highest rate for receiving data.

Please replace the paragraph starting on page 17, line 29, to read as follows:

As shown in the embodiment of ~~Figure~~ FIG. 1, the remote stations 6 are mobile and capable of changing associations among the different base stations 4. For example, a remote station 6f is initially receiving data transmissions from the base station 4f. The remote station 6f may then move out of the cell of the base station 4f and into the cell of the base station 4g. The remote station 6f can then start transmitting its DRC signal to alert the base station 4g instead of the base station 4f. By not receiving a DRC signal from the remote station 6f, logic at the base station 4f deduces that the remote station 6f has disengaged and is no longer to receive data transmissions. The data queue associated with the remote station 6f may then be transmitted to the base station 4g via a land line or RF communication link.

Please replace the paragraph starting on page 19, line 11, to read as follows:

~~Figures~~ FIGs. 6a through 6c show a flow diagram illustrating the logic performed at step 110 (~~Figure~~ FIG. 3) according to an embodiment. Step 402 initializes the identity of the Selected_Queue as being the first data queue having data for transmission to an associated remote station 6. At steps 402 through 422, the channel scheduler 12 determines whether this initial queue or a different data queue having data should be selected for transmission to its associated remote station 6. The Next_Queue is then retrieved at step 406 and step 408 determines whether this Next_Queue has data. If the Next_Queue does not have data, execution returns to step 406 to select a subsequent data queue. Otherwise, if this Next_Queue has data, the identity of the Current_Queue is assigned the Next_Queue. If the weight of the Current_Queue exceeds the weight of the Selected_Queue, step 412 returns execution to step 406 to retrieve a subsequent Next_Queue. Otherwise, step 414 determines whether the weight of the Current_Queue is less than the weight of the Selected_Queue. If the weight of the Current_Queue is less than the weight of the Selected_Queue, step 414 moves execution to step 420 to assign the identity of the Current_Queue to the Selected_Queue.

Please replace the paragraph starting on page 20, line 11, to read as follows:

~~Figures~~ FIGs. 7a through 7d show a flow diagram illustrating a second embodiment of the logic performed at the step 110 for selecting a queue for transmission to an associated remote

station 6. In this embodiment, it is assumed that each base station 4 periodically transmits a control signal to all associated remote stations 6 having a fixed duration (such as eight to sixteen time slots). According to an embodiment, the base station 4 transmits this control signal once every 400 msec. During this control transmission, no data from any data queue 40 (~~Figure~~ FIG. 2) may be transmitted to an associated remote station 6. An objective of the embodiment shown at ~~Figures~~ FIGs. 7a and 7b is to select only those data queues which may completely transmit for a service interval having a length determined at step 108 before the beginning of the next control signal transmission.

Please replace the paragraph starting on page 21, line 1, to read as follows:

Steps 504 through 508 examine the remaining data queues to determine the data queues having associated service interval (determined at step 108) which may be completely transmitted prior to the beginning of the next control signal transmission. Upon meeting the criteria set forth at steps 507 and 508, the Current_Queue is assigned as the Next_Queue. Steps 512 through 526 then perform a selection process according to queue weights in a manner similar to that discussed above in connection with steps 412 through 426 in ~~Figures~~ FIGs. 6a through 6c. However, in the embodiment of ~~Figures~~ FIGs. 7a through 7d, only those data queues having an assigned packet length which may be completed prior to the beginning of the next control signal transmission may be candidates for selection based upon the associated queue weight.

Please replace the paragraph starting on page 21, line 1, to read as follows:

~~Figures~~ FIGs. 8a and 8b show a flow diagram illustrating a third embodiment of the logic executed at step 110 at ~~Figure~~ FIG. 3 for selecting a queue for transmission. In this embodiment, subscribers of select remote units 6 are guaranteed a minimum average rate of data transmission. For each such premium remote unit, the channel scheduler 12 maintains a timer which alerts the channel scheduler 12 to schedule a transmission to its premium queue, regardless of the weights associated with the remaining queues. The time interval for the particular timer is determined based upon the average data rates guaranteed to the customer, the service interval assigned to that data queue at step 108 (see center column of Table 1), and any instantaneous data rate for receiving data determined at step 106. Thus, the time interval associated with the premium

queue timer is dynamic with respect to these values. According to an embodiment, the timer interval is determined whenever the timer is reset as follows:

$$T_j = \frac{Data\_Size(L_j)}{r_j}$$

where:

T_j = timer interval for premium queue j

Data_Size (Lj) = quantity of data to be transmitted in service interval assigned to the premium queue j

r_j = average data transmission rate guaranteed to the premium subscriber associated with the premium queue j

Please replace the paragraph starting on page 22, line 8, to read as follows:

The timer is reset at either of two events. The first event initiating a reset of the timer is an expiration of the timer interval. The second event for initiating a reset of the timer is a selection of the associated premium data queue based upon its associated weight in a manner discussed above with reference to ~~Figures~~ FIGs. 6a through 6c.

Please replace the paragraph starting on page 22, line 13, to read as follows:

Steps 606 through 610 determine whether the Next_Queue is a premium queue entitled to a minimum average rate of receiving data and, if so, whether the timer associated with that premium queue has expired. If the timer has expired, step 612 assigns the identity of the Next_Queue to the Selected_Queue and execution at step 110 completes. The weight of the selected queue is then updated at step 112 as discussed above. If there are no premium queues with an expired timer, step 614 initiates the selection of the queue for transmission in the subsequent service interval at step 616 based upon the weights of the queues in a manner discussed above with references to ~~Figures~~ FIGs. 6a through 6c. If the queue selected at step 616 is a premium queue having an associated timer, step 618 initiates a reset of the timer associated with the selected queue at step 620.

Please replace the paragraph starting on page 26, line 24, to read as follows:

FIG. 11a is a block diagram of a forward link architecture configured in accordance with an exemplary embodiment of the present invention. The data is partitioned into data packets and provided to CRC encoder 712. For each data packet, CRC encoder 712 generates frame check bits (e.g., the CRC parity bits) and inserts code tail bits. The formatted packet from CRC encoder 712 comprises the data, the frame check and code tail bits, and other overhead bits described below. In the exemplary embodiment, encoder 714 encodes the formatted packet in accordance with the encoding format disclosed in U.S. Patent No. 5,933,462, entitled "SOFT DECISION OUTPUT DECODER FOR DECODING CONVOLUTIONALLY ENCODED CODEWORDS", issued August 3, 1999, assigned to the assignee of the present invention and incorporated by reference herein. One skilled in the art will appreciate that other well known encoding formats can also be used and are within the scope of the present invention. The encoded packet from encoder 714 is provided to interleaver 716, which reorders the code symbols in the packet. The interleaved packet is provided to frame puncture element 718, which removes a fraction of the packet in a manner described below. The punctured packet is provided to multiplier 720, which scrambles the data with the scrambling sequence from scrambler 722. Puncture element 718 and scrambler 722 are described in detail in the aforementioned U.S. Patent Application Serial No. 08/963,386, now U.S. Patent No. 6,574,211. The output from multiplier 720 comprises the scrambled packet.

Please replace the paragraph starting on page 27, line 11, to read as follows:

The scrambled packet is provided to variable rate controller 730, which demultiplexes the packet into K parallel inphase and quadrature channels, where K is dependent on the data rate. In the exemplary embodiment, the scrambled packet is first demultiplexed into the inphase (I) and quadrature (Q) streams. In the exemplary embodiment, the I stream comprises even-indexed symbols and the Q stream comprises odd-indexed symbols. Each stream is further demultiplexed into K parallel channels such that the symbol rate of each channel is fixed for all data rates. The K channels of each stream are provided to Walsh cover element 732, which covers each channel with a Walsh function to provide orthogonal channels. The orthogonal channel data are provided to gain element 734 which scales the data to maintain a constant total-energy-per-chip (and hence

constant output power) for all data rates. The scaled data from gain element 734 is provided to multiplexer (MUX) 760, which multiplexes the data with the preamble. The preamble is discussed in detail in the aforementioned U.S. Patent Application Serial No. 08/963,386, now U.S. Patent No. 6,574,211. The output from MUX 760 is provided to multiplexer (MUX) 762, which multiplexes the traffic data, the power control bits, and the pilot data. The output of MUX 762 comprises the I Walsh channels and the Q Walsh channels.

Please replace the paragraph starting on page 28, line 1, to read as follows:

The block diagram of the forward link pilot channel of the exemplary embodiment is also shown in FIG. [[11A]] 11a. In the exemplary embodiment, the pilot data comprises a sequence of all zeros (or all ones) which is provided to multiplier 756. Multiplier 756 covers the pilot data with Walsh code W0. Since Walsh code W0 is a sequence of all zeros, the output of multiplier 756 is the pilot data. The pilot data is time multiplexed by MUX 762 and provided to the I Walsh channel which is spread by the short PNI code within complex multiplier 814 (see FIG. [[11B]]11b).

Please replace the paragraph starting on page 28, line 9, to read as follows:

The exemplary block diagram of the power control channel is also shown in FIG. [[11A]]11a. The Reverse Power Control (RPC) bits are provided to symbol repeater 750, which repeats each RPC bit a predetermined number of times. The repeated RPC bits are provided to Walsh cover element 752, which covers the bits with the Walsh covers corresponding to the RPC indices. The covered bits are provided to gain element 754, which scales the bits prior to modulation to maintain a constant total transmit power. In the exemplary embodiment, the gains of the RPC Walsh channels are normalized so that the total RPC channel power is equal to the total available transmit power. The gains of the Walsh channels can be varied as a function of time for efficient utilization of the total base station transmit power while maintaining reliable RPC transmission to all active remote stations 6. In the exemplary embodiment, the Walsh channel gains of inactive remote stations 6 are set to zero. Automatic power control of the RPC Walsh channels is possible using estimates of the forward link quality measurement from the

corresponding DRC channel from remote stations 6. The scaled RPC bits from gain element 754 are provided to MUX 762.

Please replace the paragraph starting on page 28, line 25, to read as follows:

A block diagram of the exemplary modulator used to modulate the data is illustrated in FIG. [[11B]]11b. The I Walsh channels and Q Walsh channels are provided to summers 812a and 812b, respectively, which sum the K Walsh channels to provide the signals Isum and Qsum, respectively. The Isum and Qsum signals are provided to complex multiplier 814. Complex multiplier 814 also receives short PNI and PNQ sequences from short code generator 838, and multiplies the two complex inputs in accordance with the following equation[[ ]]:

Please replace the paragraph starting on page 29, line 16, to read as follows:

For example, one skilled in the art will appreciate that complex multiplier 814 and short code generator 838 can be replaced by a ~~pseudonoise~~ pseudo-noise (PN) spreader that performs simple multiplication of signals by PN short codes instead of complex multiplication. In addition, encoder 714 may use any of several forward error correction techniques including turbo-coding, convolutional coding, or other forms of soft decision or block coding. Also, interleaver 716 may utilize any of a number of interleaving techniques, including block interleaving, e.g., bit reversal interleaving, or pseudo-random interleaving.[[.]]